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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
TORRES, JOSEPH D	
ART UNIT	**PAPER NUMBER**
2133	

DATE MAILED: 07/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/074,115	BUCKLEY ET AL.	
	Examiner	Art Unit	
	Joseph D. Torres	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 May 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,7-11,15-18 and 22-24* is/are rejected.

7)☒ Claim(s) *4-6,12-14 and 19-21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 February 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "316" has been used to designate both a Rate Matching Unit in Figure 4 and a Physical Channel Mapping block in Figure 3. Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 1-3, 11, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eroz; Mustafa et al. (US 6370669 B1, hereafter referred to as Eroz) in view of Kim; Min-Goo et al. (US 6697986 B2, hereafter referred to as Kim).

35 U.S.C. 103(a) rejection of claims 1 and 17.

Eroz teaches puncturing a data stream for a first transmission to provide a set of first unpunctured trellis sections (Pattern Puncturing Scheme 1 in Figure 9 of Eroz provides a puncturing scheme for a first encoder output [x(t), $y_0(t)$, $y_1(t)$] to be transmitted, i.e., a first transmission, that produces a first set of unpunctured bit sections to be transmitted; Note: convolution codes are decoded using a decoding algorithm that traverses the convolutional code's Trellis diagram in time, hence the first unpunctured bit sections are first unpunctured trellis sections; Note: also that non-adjacent bits of $y_1(t)$ are punctured); puncturing a data stream for a second transmission to provide a set of second unpunctured trellis sections (Pattern Puncturing Scheme 1 in Figure 9 of Eroz provides a puncturing scheme for a second encoder output [x'(t), $y'_0(t)$, $y'_1(t)$] to be transmitted, i.e., a second transmission, that produces a second set of unpunctured bit

sections to be transmitted; Note: convolution codes are decoded using a decoding algorithm that traverses the convolutional code's Trellis diagram in time, hence the second unpunctured bit sections are second unpunctured trellis sections; Note: also that non-adjacent bits of $y'_1(t)$ are punctured); and combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections (Spread Spectrum Modulator 214 In Figure 2 of Eroz is a device for combining combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections; Note: non-adjacent bits of $y_1(t)$ and $y'_1(t)$ are punctured, hence the first and second transmissions are non-adjacent first and second unpunctured trellis sections).

However Eroz does not explicitly teach the specific use of **an incremental redundancy unit** for combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections.

Kim, in an analogous art, teaches use of an incremental redundancy unit for combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections (Figure 6A in Kim is an incremental redundancy rate matching unit for combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections). Note: Eroz explicitly teaches rate compatible puncturing of Turbo codes to support incremental redundancy (col. 2, lines 36-40, Eroz), but does not explicitly teach the required incremental redundancy unit necessary to support incremental redundancy. On the other hand,

Kim, in an analogous art, teaches use of an incremental redundancy unit necessary to support incremental redundancy as taught in the Eroz patent.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Eroz with the teachings of Kim by including use of an incremental redundancy unit for combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of an incremental redundancy unit for combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections would have provided the opportunity to provide support for incremental redundancy as taught in the Eroz patent (col. 2, lines 36-40, Eroz).

35 U.S.C. 103(a) rejection of claims 2 and 18.

Col. 14, lines 23-24 of Eroz teaches a rate 4/9 punctured turbo code whereby uniformly 3 out of every 8 parity is punctured from both encoders, hence the composite punctured code is uniform.

35 U.S.C. 103(a) rejection of claim 3.

Non-adjacent bits of $y_1(t)$ and $y'_1(t)$ are punctured in Figure 9 of Eroz to produce orthogonal punctured trellis sections.

35 U.S.C. 103(a) rejection of claim 11.

Eroz teaches puncturing a data stream for a first transmission to provide a set of first unpunctured trellis sections (Pattern Puncturing Scheme 1 in Figure 9 of Eroz provides a puncturing scheme for a first encoder output [x(t), $y_0(t)$, $y_1(t)$] to be transmitted, i.e., a first transmission, that produces a first set of unpunctured bit sections to be transmitted; Note: convolution codes are decoded using a decoding algorithm that traverses the convolutional code's Trellis diagram in time, hence the first unpunctured bit sections are first unpunctured trellis sections; Note: also that non-adjacent bits of $y_1(t)$ are punctured); puncturing a data stream for a second transmission to provide a set of second unpunctured trellis sections (Pattern Puncturing Scheme 1 in Figure 9 of Eroz provides a puncturing scheme for a second encoder output [x'(t), $y'_0(t)$, $y'_1(t)$] to be transmitted, i.e., a second transmission, that produces a second set of unpunctured bit sections to be transmitted; Note: convolution codes are decoded using a decoding algorithm that traverses the convolutional code's Trellis diagram in time, hence the second unpunctured bit sections are second unpunctured trellis sections; Note: also that non-adjacent bits of $y'_1(t)$ are punctured); and combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections (Spread Spectrum Modulator 214 In Figure 2 of Eroz is a device for combining combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections; Note: non-adjacent bits of $y_1(t)$ and $y'_1(t)$ are punctured, hence the first and second transmissions are non-adjacent first and second unpunctured trellis sections). In addition, Col. 14, lines 23-24 of Eroz

teaches a rate 4/9 punctured turbo code whereby uniformly 3 out of every 8 parity is punctured from both encoders, hence the composite punctured code is uniform. However Eroz does not explicitly teach the specific use of **an incremental redundancy unit** for combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections.

Kim, in an analogous art, teaches use of an incremental redundancy unit for combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections (Figure 6A in Kim is an incremental redundancy rate matching unit for combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections). Note: Eroz explicitly teaches rate compatible puncturing of Turbo codes to support incremental redundancy (col. 2, lines 36-40, Eroz), but does not explicitly teach the required incremental redundancy unit necessary to support incremental redundancy. On the other hand, Kim, in an analogous art, teaches use of an incremental redundancy unit necessary to support incremental redundancy as taught in the Eroz patent.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Eroz with the teachings of Kim by including use of an incremental redundancy unit for combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of an incremental redundancy unit for combining the first and second transmissions

of the trellises to provide non-adjacent first and second unpunctured trellis sections would have provided the opportunity to provide support for incremental redundancy as taught in the Eroz patent (col. 2, lines 36-40, Eroz).

3. Claims 7-9, 15, 16 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eroz; Mustafa et al. (US 6370669 B1, hereafter referred to as Eroz) and Kim; Min-Goo et al. (US 6697986 B2, hereafter referred to as Kim) in view of Ostman; Kjell (US 6738370 B2).

35 U.S.C. 103(a) rejection of claims 7 and 22.

Eroz and Kim substantially teaches the claimed invention described in claims 1-3, 11 (as rejected above). In addition, Eroz teaches channel interleaver 212 for interleaving rate matched turbo coded bits.

However Eroz and Kim do not explicitly teach the specific use of mapping of systematic bits to position of higher reliability in a modulation constellation.

Ostman, in an analogous art, teaches mapping of bits to position of higher reliability in a modulation constellation to increase overall system reliability (col. 7, lines 29-32 in Ostman).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Eroz and Kim with the teachings of Ostman by including use of mapping of systematic bits to position of higher reliability in a modulation constellation. This modification would have been obvious to one of ordinary skill in the

art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of mapping of systematic bits to position of higher reliability in a modulation constellation would have provided the opportunity to increase overall system reliability.

35 U.S.C. 103(a) rejection of claims 8, 9, 15, 16, 23 and 24.

Eroz, Kim and Ostman substantially teaches the claimed invention described in claims 1-3 and 7 (as rejected above). In addition, Eroz teaches channel interleaver 212 for interleaving rate matched turbo coded bits.

However Eroz, Kim and Ostman do not explicitly teach the specific use of specific interleaving components.

The Examiner asserts that channel interleaver 212 encompasses any specific embodiment of the interleaver and one of ordinary skill in the art at the time the invention was made would have been highly motivated to create a specific embodiment of the interleaver in order to implement the teachings of Eroz, Kim and Ostman. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Eroz, Kim and Ostman by including Eroz, Kim and Ostman. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that Eroz, Kim and Ostman would have provided the opportunity to implement the required interleaver in Eroz.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eroz; Mustafa et al. (US 6370669 B1, hereafter referred to as Eroz) and Kim; Min-Goo et al. (US 6697986 B2, hereafter referred to as Kim) in view of the 3GPP paper (3GPP TR 25.858 v1.0.4 (2002-01) 3 Generation Partnership Project: Technical Specification Group Radio Access Network; High Speed Downlink Packet Access; Physical Layer Aspects, Release 5).

35 U.S.C. 103(a) rejection of claim 10.

Eroz and Kim substantially teaches the claimed invention described in claims 1-3 (as rejected above).

However Eroz and Kim do not explicitly teach the specific use of a forward control channel.

The 3GPP paper, in an analogous art, teaches use of a forward control channel.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Eroz and Kim with the teachings of the 3GPP paper by including use of a forward control channel. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of a forward control channel would have provided the opportunity to inform the receiver of changes in coding and modulation.

Allowable Subject Matter

5. Claims 4-6, 12-14 and 19-21 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The present invention pertains to method for improving turbo code based incremental redundancy, the method comprising the steps of: puncturing a data stream for a first transmission to provide a set of first unpunctured trellis sections; puncturing a data stream for a second transmission to provide a set of second unpunctured trellis sections; and incremental redundancy combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections. Claim 4 recites the use of a modified version of the 3GPP equations for the rate matching initial error parameter e_{ini}.

Eroz teaches puncturing a data stream for a first transmission to provide a set of first unpunctured trellis sections (Pattern Puncturing Scheme 1 in Figure 9 of Eroz provides a puncturing scheme for a first encoder output [x(t), $y_0(t)$, $y_1(t)$] to be transmitted, i.e., a first transmission, that produces a first set of unpunctured bit sections to be transmitted; Note: convolution codes are decoded using a decoding algorithm that traverses the convolutional code's Trellis diagram in time, hence the first unpunctured bit sections are first unpunctured trellis sections; Note: also that non-adjacent bits of $y_1(t)$ are punctured); puncturing a data stream for a second transmission to provide a set of

second unpunctured trellis sections (Pattern Puncturing Scheme 1 in Figure 9 of Eroz provides a puncturing scheme for a second encoder output [x'(t), $y'_0(t)$, $y'_1(t)$] to be transmitted, i.e., a second transmission, that produces a second set of unpunctured bit sections to be transmitted; Note: convolution codes are decoded using a decoding algorithm that traverses the convolutional code's Trellis diagram in time, hence the second unpunctured bit sections are second unpunctured trellis sections; Note: also that non-adjacent bits of $y'_1(t)$ are punctured); and combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections (Spread Spectrum Modulator 214 In Figure 2 of Eroz is a device for combining combining the first and second transmissions of the trellises to provide non-adjacent first and second unpunctured trellis sections; Note: non-adjacent bits of $y_1(t)$ and $y'_1(t)$ are punctured, hence the first and second transmissions are non-adjacent first and second unpunctured trellis sections).

The prior art however are not concerned with and do not teach, suggest, or otherwise render obvious the modified version of the 3GPP equations for the rate matching initial error parameter e_{ini} as taught by claim 4 and its base and intervening claims. Hence the prior art taken alone or in any combination fail to teach the claimed novel feature in claim 4 in view of its base and intervening claims.

Claim 5 recites a specific version of the rate matching initial error parameter e_{ini} as taught by claim 4.

Claim 6 depends from claim 5.

Claim 12 substantially recites the same language as in claim 4.

Claim 13 substantially recites the same language as in claim 5.

Claim 14 recites a modified version of the 3GPP algorithm for calculating parameters for the rate matching initial error parameter e_{ini} as taught by claim 13. The prior art are not concerned with and do not teach, suggest, or otherwise render obvious the modified version of the 3GPP algorithm for calculating parameters for the rate matching initial error parameter e_{ini} as taught by claim 14 and its base and intervening claims. Hence the prior art taken alone or in any combination fail to teach the claimed novel feature in claim 14 in view of its base and intervening claims.

Claim 19 substantially recites the same language as in claim 4.

Claim 20 substantially recites the same language as in claim 5.

Claim 21 substantially recites the same language as in claim 6.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (703) 308-7066. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (703) 305-9595. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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